Assurance Office. The marriage was a most happy one, and surrounded by a family of seven children, of whom three at least died before their father, De Morgan sought his happiness, as we have endeavoured to show, in his home, amongst his books, and in the earnest discharge of his professorial and other duties.

The Memoir is charmingly written, and abounds in graphic details, which bring clearly before the reader the picture of a simple, manly character that was unique in its idiosyncrasy. A prominent object in its production has been to tell the story of the Professor's connection with University College, and of the events which led to his leaving it. "After the lapse of sixteen years I trust that the narrative will provoke no revival of the somewhat acrimonious controversy which ensued."

Another feature of the work is the selection from De Morgan's extensive correspondence with contemporary scientific men; these letters are full of interest, and abound in utterances characteristic of the writer. Always effective and to the point, they are often very humorous: the humour, indeed, sometimes borders upon trifling.

Instead of thinking that Mrs. De Morgan has exceeded due limits in her selection, we would have welcomed a far larger number of specimens. On p. 333 De Morgan states that he had corresponded for thirty years with Sir W. Rowan Hamilton, but no specimens of the correspondence are given. In one or two cases Mrs. De Morgan has deviated from the general rule she laid down for herself, and to this deviation we are indebted for some very interesting letters from the late Sir Frederick Pollock, which enlighten one as to what was required to be read for the Senior Wranglership at the beginning of the present century. Is it too much to hope that another volume may be issued containing a further selection from the correspondence, and also a few of the more valuable of the early papers, such as those which appeared in the *Journal of Education*, and in the *Companion to the British Almanac?* We venture to give the following extract from a letter we received under date May 15, 1869, as an ordinary specimen of his writing to one who had no special claim upon the writer:—". . . I should decidedly object to the reference made to Barrow on the last leaf. 'Dr. Barrow with an orthodox dislike to give unnecessary credit to a Moslem author has misled. . . .' When was there an orthodox dislike to Mahometans being discoverers in science? And what possible reason is there for imputing any such feeling to Barrow, a man of most unimpeachable fairness, except in this, that when he had a congregation by the ears he would hold on for three hours until they prevailed on the organist to 'blow him down.' He had lived among the Turks at Smyrna and Constantinople, and was certainly not ill-inclined to a Mahometan, as such. But this much is enough: the imputation is quite new, or nearly so, and should not appear without proof in the *obiter dictum* of an historical writer who obviously makes it a theory to explain something he has found. . . . P.S.—I think that for one orthodox man who might be supposed likely to rob a Mahometan of geometry, I could find three who would have been more likely to toss it back again with the remark that such infidel stuff was only fit for Mahound and his slaves."

A list of writings is appended. In this we notice the following slips:—"Elements of Arithmetic," the dates should be "1st edition, 1830; 3rd, 1835"; on p. 403, in (18) for "No. 3" read § 3 of (15) supra"; p. 404, in (18) dele "1," and in (6) for "Trigonometry" read "Geometry; p. 405, (5) should, of course, be "$Pdx+Qdy+Rdz$"; p. 406, in 1849, insert "Remarks" after "Supplementary"; in (1), (2), we think the dates are inaccurate; p. 407, read "Al*f*onsine."

We remark also that no account is taken of communications to the Mathematical Society. These were ten in number, not counting the Opening Address, which forms the first number of the Society's *Proceedings*. The only papers printed are "A Proof that every Function has a Root" (No. vi., a mere notelet); "Remark on paper by Mr. Woolhouse 'on General Numerical Solution'" (No. xiv.); and "On the Conic Octagram" (No. x. pp. 26-29). In this last paper occurs the characteristic note: "This presentation of the second hexagon was actually suggested to me by observing that *Bloise Pascal* has two hexagrams, and the jocose inference that there ought to be two hexagons in the theorem (given in the paper). My own names are both octagrams; but though I bow before the coincidence, I have no suggestion to acknowledge." There is a fairly full "Index of Names, &c.," but we do not grasp the principle upon which it is drawn up, as some names are inserted and others left out. We failed at first to identify "Prof. John Adams" with "Neptune" Adams. There are also the following corrections to be be made:—Read "J. Baldwin Brown," "Arthur Cayley" (both here and in the "Budget of Paradoxes" the famous mathematician is called "George"), Hanssen (for Haussen), Encke (for Hencke), Royal Society (insert the most important reference to p. 172), Sedgwick, Rev. C. Simeon (not J.), insert John Taylor, p. 122, and dele "p. 124" under Sedley Taylor. On p. 306 we presume x should be $\dot{x}$, and on p. 286, for 1866 read 1865; the present writer succeeded George De Morgan as teacher in the session 1865-66.

R. TUCKER

FISHES OF SWITZERLAND

Faune des Vertébrés de la Suisse. Par Victor Fatio, Dr. Phil. Vol. IV. Histoire naturelle des Poissons. 1re partie I. Anarthropterygiens. II. Physostomes-Cyprinidés. 8°. pp. xiv. et 786, avec 5 planches (Génève et Bale: H. Georg, 1882.)

AFTER an interval of nearly ten years Dr. Fatio has issued another volume of the series of excellent monographs, in which he gives the results of his researches into the vertebrate fauna of Switzerland. The first volume, published in the year 1869, contained the Mammals; the third (1872) the Reptiles and Batrachians; the second, which will be devoted to Ornithology, being still in course of preparation. The one now published, which is the fourth of the series, treats of a part of the Fishes, which class will be concluded in the fifth.

No one who studies this volume will be surprised at the long lapse of time which intervened between its appearance and that of the preceding. The author had not the advantage of being assisted in his work by collections already formed and available for the purpose, but had to collect the materials himself; a labour which, even in a small country like Switzerland, takes years to

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accomplish; especially as, for comparison's sake, he extended his researches to the fauna of the neighbouring countries. His descriptions are well elaborated and compiled from numerous observations; they include all the variations of age, sex, season, locality, &c., and particular notice is taken of those modifications, by which Swiss examples seem to be distinguished from those of Germany, France, Italy, &c. Thus, this work rises far above the level of a local publication, and is of as great a value to the student of European freshwater fishes, as to the Swiss naturalist.

The present volume treats of the Acanthopterygians and Cyprinoids only, 5 species of the former and 21 of the latter being admitted as permanent inhabitants of the country. Besides, the author distinguishes 3 sub-species, many varieties, and 3 hybrids; he also refers in shorter chapters to 13 other species and 6 hybrids, which are extra-limital, or may sooner or later be found straying into Switzerland.[1] This number of the freshwater fishes of Switzerland must appear small, when we consider that it comprises representatives of four of the principal river-systems of Europe, viz. the Rhine, Rhone, Po, and Danube; and there is no doubt that this comparative poverty is due to the altitude of the country, freshwater Acanthopterygians and Cyprinoids being generally more developed in the less rapid waters of warmer low-lying countries. The Rhine contributes the majority; 20 out of the 24 species[2] which inhabit the middle and lower sections of the river, ascending beyond the Falls of Schaffhausen. The Rhone is inhabited by 24 species, but, singularly, of these 11 only have been able to establish themselves above the Perte du Rhone, although the others freely enter the Saone or penetrate even into the upper Doubs, a river not included in Swiss territory. Of the 23 species found in the lower part of the Po, 15 reach the Swiss frontier; and this southern portion of the fauna is in its character so distinct from the northern, that 9 only of these 15 species are identical with Rhine fishes. Finally the fish-fauna of the Danube, which is stated to consist of 30 species, is represented in Switzerland by 3 only, the great altitude of the river Inn proving a most effectual barrier to the dispersal of the remainder. Moreover, these three species are common Central European types, and not peculiar to the Danube.

The author has taken great pains to ascertain the extreme limits of altitude, to which the several species can attain in the Alps. Two only go beyond the height of 2000 metres, viz. the minnow and miller's thumb, which are still found at respectively 2400 and 2200 m. The perch, the next in order, reaches an altitude of 2000 m., all the remainder living at, or below, 800 m. However, several have been successfully imported to altitudes varying between 1000 and 1700 m., thus the carp, tench, rudd, roach, and chub.

Of the fishes described in this volume, we wish to draw particular attention to two which, belonging to marine genera, and evidently being of marine origin, have acclimatised themselves in the fresh waters of Southern Europe, and penetrated into, or close to, the confines of Switzerland, viz. a goby (*Gobius fluviatilis* or *martensii*), which has ascended the Po, and a blenny (*Blenniu cagnata*), which occurs in abundance in Lago Maggiore as well as in the lake of Bourget in Savoy.

Hybrids are comparatively scarce in Switzerland. The author justly accounts for their scarcity by the physical peculiarities of his country; snow-fed, rapid rivers are less adapted for their production, than the slower and warmer waters of low countries, where a greater variety of species and a larger number of individuals are mixed together, sometimes within very narrow limits.

The volume is illustrated by five well executed plates, three of which are devoted to osteological, dental, and dermal details.

The author of a thoroughly original work like the present, cannot fail to differ from his predecessors in questions of specific distinctions and numerous other points of detail, but it is our duty to testify to the fair and calm spirit, in which such questions are discussed and treated by him; and we hope that, before many years, we shall have the pleasure of announcing to our readers the completion of so valuable a work as Dr. Fatio's Ichthyology of Switzerland.

OUR BOOK SHELF

China. By Robert K. Douglas. (Society for Promoting Christian Knowledge, 1882.)

It may be said at once respecting this book that it is without exception the very best elementary work on China with which we are acquainted in any European language. The author has resided for many years in China, and is in the forefront of the Chinese scholarship of our time; his work is, therefore, not only accurate, but it places the reader abreast of the latest researches. One of the most remarkable of these is fully explained at pp. 359-60. The *Yih King*, or Book of Changes, is the work for which the greatest antiquity is claimed by the Chinese. Some writers have placed it as far back as between 300 and 400 B.C. However this may be, the key to its interpretation has been entirely lost, although the best native scholars of all ages, including Confucius himself, have attempted to explain it. M. Terrien de la Couperie (assisted, we believe, by Prof. Douglas himself, though this fact is not mentioned), has succeeded within the last few years in showing that "instead of being a mysterious depository of deep divinatory lore, it turns out to be a collection of syllabaries such as are common in Accadian literature interspersed with chapters of astrological formulæ, ephemerides, and others dealing with ethnological facts relating to the Aboriginal tribes of the country; but all taking the form of vocabularies, and therefore as impossible to be translated in the sense in which every commentator, from Confucius downwards, has attempted to translate them as 'Johnson's Dictionary' would be." Although we possess innumerable volumes on subjects connected with China, we have not until now a thoroughly trustworthy book covering the whole ground in a simple elementary manner. Some volumes recently published for popular reading on the countries of the East exhibit such lamentable ignorance, that we can only "gasp and stare" at their contents. Notwithstanding his own intimate knowledge of the subject, Prof. Douglas has consulted almost all that we have in our literature relating in any way to China, from Davis's Chinese poetry and Oppert's Susian texts, down to recent numbers of the English journals published in China. The two last chapters—that on "Language" and "Literature"—are models of clear and simple exposition of complicated subjects. Another excellence of the book is what we may call its perspective. The writer does not thrust any particular branch of his subject into undue prominence, to

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[1] The second part of the Ichthyology is estimated to contain about 21 species.

[2] These and the following numbers refer to the Acanthopterygians and Cyprinoids only.

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